

The First U–Pb SIMS Age Datings of Zircons from Upper Permian Deposits of the Northeastern Russia: Significance for Interregional Correlations

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Abstract—The Regional Stratigraphic Scale (RSS) of the Permian deposits in northeastern Russia represents the only complete stratigraphic succession of Permian marine deposits distinguished in Russia, which serves as a standard at the correlation of Permian deposits of all regions of the eastern part of the Boreal Biogeographic Superrealm. However, a high level of faunistic endemism makes it extremely difficult to correlate directly strata of the RSS with stages of the International Stratigraphic Scale (ISS) of the Permian deposits. The first U–Pb SIMS age datings of zircons from felsic tuffs of the Omchak Formation of the Ayan-Yuryakh Anticlinorium (the lower part of the Permian Khivachian Horizon of the RSS of northeastern Russia) allowed us to obtain the important reference level for the Upper Permian subdivision of the Permian RSS. The zircon age of 257.1 ± 3.0 Ma is in good agreement with the stratigraphic position of the studied sample, which makes it possible to correlate the surrounding deposits with the Wuchiapingian Stage of the Permian deposits in the International Stratigraphic Scale.

Keywords: U–Pb SIMS age dating, zircons, Regional and International Stratigraphic Scales, Upper Permian, northeastern Russia

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INTRODUCTION

The Regional Stratigraphic Scale (RSS) of the Permian deposits in northeastern Russia represents the only complete stratigraphic succession of Permian marine deposits distinguished in Russia. Because of this, this scale is considered to be unique in many respects. Owing to a high level of justification and fossil-rich deposits, this succession has no analogs in the entire eastern part of the Boreal Biogeographic Superrealm. In terms of biostratigraphy, this scale is based on the occurrence of three quite rapidly evolving faunistic groups—brachiopods, bivalves, and small foraminifers—as well as ammonoids in Lower Permian—early Middle Permian deposits (Ganelin and Biakov, 2006). Therefore, it is no coincidence that the Permian RSS of northeastern Russia and some adjacent areas, including North Mongolia, Transbaikalia, Novosibirsk Islands, North Siberia, Taimyr, and Novaya Zemlya, serves as a standard.

At the same time, a high level of endemism of the Permian fauna from northeastern Asia (almost com-

plete absence of conodonts and fusulinids (Late Paleozoic orthostratigraphic groups) makes it impossible to directly correlate the most of the regional Permian strata in the northeastern Asia with the Permian stages of the International Stratigraphic Scale (ISS). Because of this, the transregional correlation of Permian deposits is still one of the most debatable issues for regional geology of northeastern Asia.

The problem of the dating of the Upper Permian deposits (Wuchiapingian–Changhsingian) of the studied region is very challenge inasmuch as the direct biostratigraphic correlation of the Permian sequences in northeastern Asia with the ISS stages is hardly possible owing to an absence of conodonts, fusulinids, and ammonoids in the Permian sequences of northeastern Russia. However, there is remarkable progress in this direction owing to the development of such methods as chemostratigraphy and precision radioisotope geochronology: the Permian–Triassic boundary in the studied region was established (Zakharov et al., 2014) and the first precision age data for several regional